

IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

1. (currently amended) ~~A storage device controlling device~~ system comprising:

a channel controller for receiving a data input/output request based on file-name indication from an information processing device through a network and transmitting/receiving data to/from the information processing device;

a disk controller for carrying out input/output control of data stored in a storage volume for storing the data; ~~and~~

a first memory for storing the data delivered between the channel controller and the disk controller; ~~and~~

a data transfer network connected to said channel controller, said disk controller and said first memory,

wherein the channel controller is equipped with a first processor for outputting a block-basis I/O request corresponding to the data input/output request and controlling the first memory, a file access processor circuit which has a second processor and a second memory controlled by the second processor and serves to control the transmission/reception of the data input/output request and the data ~~which is carried out with~~ sent from the information processing device, a data transfer device for controlling data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a

circuit board module, and wherein the second processor transmits information indicating the storage position of the data in the second memory to the first processor, the first processor writes into the third memory data transfer information containing information indicating the storage position of the data in the first memory and information indicating the storage position of the data in the second memory, and the data transfer device reads out the data transfer information from the third memory and controls the data transfer between the first memory and the second memory on the basis of the data transfer information thus read out.

2. (currently amended) A ~~storage device-controlling device~~ system comprising:

a channel controller for receiving a data input/output -request based on file-name indication from an information processing device through a network and transmitting/receiving data to/from the information processing device;

a disk controller for carrying out input/output control of data stored in a storage volume for storing the data; and

a first memory for storing the data delivered between the channel controller and the disk controller; and

a data transfer network connected to said channel controller, said disk controller and said first memory.

wherein the channel controller is equipped with a first processor for outputting a block-basis I/O request corresponding to the data input/output, request and controlling the first memory, a file access ~~processor~~ circuit ~~witch~~ has a second

processor and a second memory controlled by the second processor and serves to control the transmission/reception of the data input/output request and the data which is ~~carried out with~~sent from the information processing device, a data transfer device for controlling data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a circuit board, and

wherein the second processor transmits information indicating the storage position of the data in the second memory to the first processor, the first processor writes into the third memory data transfer information containing information indicating the storage position of the data in the first memory and information indicating the storage position of the data in the second memory- and transmits the storage position of the data transfer information in the third memory to the data transfer device, and the data, transfer device reads out the data transfer information from the third memory and controls the data transfer between the first memory and the second memory on the basis of the data transfer information thus read out.

3. (currently amended)~~A storage device controlling devices~~system comprising:

a channel controller for receiving a data input/output request based on file-name indication from an information processing device through a network and transmitting/receiving data to/from the information processing device;

a disk controller for carrying out input/output control of data stored in a storage volume for storing the data; and

a first memory for storing the data delivered between the channel controller and the disk controller; and

a data transfer network connected to said channel controller, said disk controller and said first memory.

wherein the channel controller is equipped with a first processor for outputting a block-basis I/O request corresponding to the data input/output request and controlling the first memory, a file access ~~processor~~ circuit which has a second processor and a second memory controlled by the second processor and serves to control the transmission/reception of the data input/output request and the data which is carried out with the information processing device, a data transfer device for controlling data transfer between the first memory and the, second memory, and a third memory controlled by the first processor, which are formed on a circuit board, and

wherein the first processor writes into the third memory first data transfer information containing information indicating the storage position of the data in the first memory, the second processor writes into the second memory second data transfer information containing information indicating the storage position of the data in the second memory, and the data transfer device reads out the second data transfer information from the second memory, reads out the first data transfer information from the third memory, and controls the data transfer between the first memory and the second memory based ~~on the basis of~~ the first data transfer information and the second data transfer information.

4. (currently amended) A storage device-controlling devicesystem
comprising:

a channel controller for receiving a data input/output request based on file-name indication from an information processing device through a network and transmitting/receiving data to/from the information processing device;

a disk controller for carrying out input/output control of data stored in a storage volume for storing the data; and

a first memory for storing the data delivered between the channel controller and the disk controller; and

a data transfer network connected to said channel controller, said disk controller and said first memory.

wherein the channel controller is equipped with a first processor for outputting a block-basis I/O request corresponding to the data input/output request and controlling the first memory, a file access processor circuit which has a second processor and a second memory controlled by the second processor and serves to control the transmission/reception of the data input/output request and the data which is carried out with the information processing device, a data transfer device for controlling data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a circuit board, and

wherein the first processor writes into the third memory first data transfer information containing information indicating the storage position of the data in the first memory, the second processor writes into the second memory second data

transfer information containing information indicating the Storage position of the data in the second memory, the second processor transmits information indicating the storage position of the second data transfer information to the first processor, the first processor transmits to the data transfer device transfer start information containing information indicating the storage position of the first data transfer information and information indicating the storage position of the second data transfer information, and the data transfer device reads out the second data transfer information from the second memory on the basis of the transfer start information, reads out the first data transfer from the third memory on the basis of the transfer start information, and controls the data transfer between the first memory and the second memory on the basis of the first data transfer information and the second data transfer information.

5. (original) The storage device controlling device according to any one of claims 1 to 4, wherein the, data transfer device writes into the third memory information indicating the result of the data transfer carried out between the first memory and the second memory.

6. (currently amended) ~~A storage device controlling device~~ system comprising:

a channel controller for receiving a data writing request based on a file-name indication and writing data from an information processing device through a network;

a disk controller for writing the writing data into a storage volume in which data are stored; and

a first memory for storing the writing data transmitted/received between the channel controller and the disk controller; and

a data transfer network connected to said channel controller, said disk controller and said first memory.

wherein the channel controller contains a first processor for outputting a block-basis write request corresponding to the data writing request and controlling the first memory, a file access ~~processor~~ circuit which has a second processor and a second memory controlled by the second processor and serves to receive the data writing request and the writing data from the information processing device, a data transfer device for controlling the data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a circuit board, and

wherein the first processor writes into the third memory first data transfer information containing information indicating the storage position of the writing data in the first memory, the second processor writes into the second memory second data transfer information containing information indicating the storage position of the writing data in the second memory and transmits information indicating the storage position of the second data transfer information to the first processor, the first processor transmits the data transfer device transfer start information containing information indicating the storage position of the first data transfer information and information indicating the storage position of the second data transfer information,

the data transfer device reads out the second data transfer information from the second memory on the basis of the transfer start information, reads out the first data transfer information from the third memory based on the basis of the, transfer start information and transfers the writing data from the second memory to the first memory on the basis of the first data transfer information and the second data transfer information, and the disk controller writes into the storage volume the writing data stored in the first memory on the basis of the write request.

7. (currently amended) ~~A storage device-controlling devices~~system comprising:

a channel controller for receiving a data read-out request based on a file-name indication from an information processing device through a network and transmitting to the information processing device read-out data read out from a storage volume for storing data;

a disk controller for reading out the read-out data from the storage volume; ~~and a first memory for storing the read-out data transmitted/received for the storage volume between the channel controller and the disk controller,~~ and

a data transfer network connected to said channel controller, said disk controller and said first memory.

wherein the channel controller comprises a first processor for outputting a block-basis read request corresponding to the data read-out request and controlling the first memory, a file access ~~processor~~circuit which has a second processor and a second memory for controlling the second processor and receives the data read-out

request from the information processing device, a data transfer device for controlling the data transfer between the first memory and the second memory, and a third memory controlled by the first memory, which are formed on a circuit board, and wherein the disk controller writes into the first memory the read-out data read out from the storage volume on the basis of the read request, the first processor writes into the third memory first data transfer information containing information indicating the storage position of the read-out data in the first memory, the second processor writes into the second memory second data transfer information containing information indicating the storage position of the read-out data in the second memory and transmits information indicating the storage position of the second data transfer information to the first processor, the first processor transmits to the data transfer device transfer start information containing information indicating the storage position of the first data transfer information and information indicating the storage position of the second data transfer information, the data transfer device reads out the second data transfer information from the second memory based on the basis of the transfer start information, reads out the first data transfer information from the third memory on the basis of the transfer start information and transfers the read-out data from the first memory to the second memory on the basis of the first data transfer information and the second data transfer information, and the second processor transmits the read-out data stored in the second memory to the information processing device.

8. (currently amended)A control method for a storage device ~~controlling device comprising:~~system including a channel controller for receiving a data

input/output request based on file-name indication from an information processing device through a network and transmitting/receiving data to/from the information processing device; a disk controller for carrying out input/output control of data stored in a storage volume for storing the data; and a first memory for storing the data delivered between the channel controller and the disk controller; and

a data transfer network connected to said channel controller, said disk controller and said first memory, the channel controller being equipped with a first processor for outputting a block-basis I/O request corresponding to the data input/output request and controlling the first memory, a file access processor circuit which has a second processor and a second memory controlled by the second processor and serves to control the transmission/reception of the data input/output request and the data which is carried out with the information processing device, a data transfer device for controlling data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a circuit board, ~~characterized in that~~ said control method comprising the steps of:

transmitting, by the second processor, ~~transmits~~ information indicating the storage position of the data in the second memory to the first processor;

writing, by the first processor, ~~writes~~ into the third memory data transfer information containing information indicating the storage position of the data in the first memory and information indicating the storage position of the data in the second memory, ~~and~~

by the data transfer device, reading out ~~reads out~~ the data transfer information from the third memory, and ~~controls~~ controlling the data transfer between the first memory and the second memory based on ~~on the basis of~~ the data transfer information thus read out.

9. (currently amended) A control method for a storage device ~~controlling device comprising~~ system including a channel controller for receiving a data input/output request based on file-name indication from an information processing device through a network and transmitting/receiving data to/from the information processing device; a disk controller for carrying out input/output control of data stored in a storage volume for storing the data; and a first memory for storing the data delivered between the channel controller and the disk controller, and a data transfer network connected to said channel controller, said disk controller and said first memory, the channel controller being equipped with a first processor for outputting a block-basis I/O request corresponding to the data input/output-request and controlling the first memory, a file access processor which has a second processor and a second memory controlled by the second processor and serves to - control the transmission/reception of the data input/output request and the data which is carried out with the information processing device, a data transfer device for controlling data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a circuit board, said control method comprising the steps of:

~~transmitting, by~~ characterized in that the second processor₁ transmits information indicating the storage position of the data in the second memory to the first processor₁;

~~by~~ the first processor₁ ~~writes-writing~~ into the third memory data transfer information containing information indicating the storage position of the data in the first memory and information indicating the storage position of the data in the second memory₁ ~~and transmits-and transmitting~~ the storage position of the data transfer information in the third memory to the data transfer device₁; and the data transfer device ~~reading out~~ reads out the data transfer information from the third memory₁ and ~~controlling~~ controls the data transfer between the first memory and the second memory ~~based~~ on the basis of the data transfer information thus read out.

10. (currently amended) A control method for a storage device ~~controlling device comprising-system including~~ a channel controller for receiving a data input/output request based on file-name indication from an information processing device through a network and transmitting/receiving data to/from the information processing device; a disk controller for carrying out input/output control of data stored in a storage volume for storing the data; ~~and-a~~ first memory for storing the data delivered between the channel controller and the disk controller₁; ~~and~~

~~a data transfer network connected to said channel controller, said disk controller and said first memory,~~ the channel controller being equipped with a first processor for outputting a block-basis I/O request-corresponding to the data input/output request and controlling the first memory, a file access ~~processor-circuit~~

which has a second processor and a second memory controlled by the second processor and serves to control the transmission/reception of the data input/output request and the data which is carried out with the information processing device, a data transfer device for controlling data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a circuit board, ~~characterized in that~~ said control method comprising the steps of:

writing, by the first processor ~~writes into~~ the third memory first data transfer information containing information indicating the storage position of the data in the first memory;

writing, by the second processor, ~~writes into~~ the second memory second data transfer information containing information indicating the, storage position of the data in the second memory; and

by the data transfer device, ~~reads~~ reading out the second data transfer information from the second memory, ~~reads~~ reading out the first data transfer information from the third memory, and ~~controls~~ controlling the data transfer between the first memory and the second memory on the basis of the first data transfer information and the second data transfer information.

11. (currently amended) ~~A control method for a storage device controlling device comprising:~~ system including a channel controller for receiving a data input/output request based on file-name indication from an information processing device through a network and transmitting/receiving data to/from the information

processing device; a disk controller for carrying out input/output control of data stored in a storage volume for storing the data; and a first memory for storing the data delivered between the channel controller and the disk controller; and

a data transfer network connected to said channel controller, said disk controller and said first memory, the channel controller being equipped with a first processor for outputting a block-basis I/O request corresponding to the data input/output request and controlling the first memory, a file access processor which has a second processor and a second memory controlled by the second processor and serves to control the transmission/reception of the data input/output request and the data which is carried out with the information processing device, a data transfer device for controlling data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a circuit board, ~~characterized in that~~ said control method comprising the steps of:

writing, by the first processor, ~~writes-~~ into the third memory first data transfer information containing information indicating the storage position of the data in the first memory;

writing, by the second processor, ~~writes-~~ into the second memory second data transfer information containing information indicating the storage position of the data in the second memory;

transmitting, by the second processor, ~~transmits-~~ information indicating the storage position of the second data transfer information to the first processor;

transmitting, by the first processor, ~~transmits-~~ to the data transfer device transfer start information containing information indicating the storage position of the

first data transfer information and information indicating the storage position of the second data transfer information₇₁; and

by the data transfer device₁ ~~reads~~reading out the second data transfer information from the second memory based on ~~the basis of~~ the transfer start information, ~~reads~~reading out the first data transfer from the third memory, based on ~~the basis of~~ the transfer start information, and ~~controls~~controlling the data transfer between the first memory and the second memory on the basis of the first data transfer information and the second data transfer information.

12. (original) The control method according to any one of claims 8 to 11, wherein the data transfer device writes into the third memory information indicating the result of the data transfer carried out between the first memory and the second memory.

13. (currently amended) ~~A control method for a storage device controlling device comprising:~~system including a channel controller for receiving a data writing request based on a file-name indication and writing data from an information processing device through a network; a disk controller for writing the writing data into a storage volume in which data are stored; ~~and~~ a first memory for storing the writing data transmitted/received between the channel controller and the disk controller₇₁; and

a data transfer network connected to said channel controller, said disk controller and said first memory, the channel controller being equipped with a first

processor for outputting a block-basis write request corresponding to the data writing request and controlling the first memory, a file access ~~processor-circuit~~ which has a second processor and a second memory controlled by the second processor and serves to receive the data writing request and the writing data from the information processing device, a data transfer device for controlling the data transfer between the first memory and the second memory, and a third memory controlled by the first processor, which are formed on a circuit board, ~~characterized in that~~said control method comprising the steps of:

writing, by the first processor₁, ~~writes-into~~ the third memory first data transfer information containing information indicating the storage position of the writing data in the first memory₁;

by the second processor₁, writing ~~writes-into~~ the second memory second data transfer information containing information indicating the storage position of the writing data in the second memory₁ and ~~transmits-transmitting~~ information indicating the storage position of the second data transfer information to the first processor₁;

transmitting, by the first processor₁, ~~transmits-~~ the data transfer device transfer start information containing information indicating the storage position of the first data transfer information and information indicating the storage position of the second data transfer information₁; and

by the data transfer device₁, reads-reading out the second data transfer information from the second memory on the basis of the transfer start information, reads-reading out the first data transfer information from the third memory on the basis of the transfer start information₁ and ~~transfers-transferring~~ the writing data from

the second memory to the first memory based on the basis of the first data transfer information and the second data transfer information₁ and

writing, by the disk controller ~~writes into the storage volume the writing data stored in the first memory~~ based on the basis of the write request.

14. (currently amended) ~~A control method for a storage device controlling device comprising: system including~~ a channel controller for receiving a data read-out request based on a file-name indication from an information processing device through a network and transmitting to the information processing device read-out data readout from a storage volume for storing data; a disk controller for reading out the read-out data from the storage volume; ~~and a first memory for storing the read-out data transmitted/received between the channel controller and the disk controller₁~~; a data transfer network connected to said channel controller, said disk controller and said first memory, the channel controller being equipped with a first processor for outputting a block-basis read request corresponding to the data read-out request and controlling the first memory, a file access processor which has a second processor and a second memory for controlling the second processor and receives the data read-out request from the information processing device, a data transfer device for controlling the data transfer between the first memory and the second memory, and a third memory controlled by the first memory, which are formed on a circuit board, ~~characterized in that~~ said control method comprising the steps of:

writing, by the disk controller₁ ~~writes into the first memory the read-out data readout from the storage volume on the basis of the read request₁~~

writing, by the first processor₁ ~~writes~~ into the third memory first data transfer information containing information indicating the storage position of the read-out data in the first memory₁;

by the second processor₁ ~~writes~~ writing into the second memory-second data transfer information containing information indicating the storage position of the read-out data in the second memory and ~~transmits~~ transmitting information indicating the storage position of the second data transfer information to the first processor₁;

transmitting, by the first processor₁ ~~transmits~~ to the data transfer device transfer start information containing information indicating the storage position of the first data transfer information and information indicating the storage position of the second data transfer information₁;

by the data transfer device₁ ~~reads~~ reading out the second data transfer information from the second memory based on the ~~basis of~~ the transfer start information, ~~reads~~ reading out the first data transfer information from the third memory based on the ~~basis of~~ the transfer start information and ~~transfers~~ transferring the read-out data from the first memory to the second memory based on the ~~basis of~~ the first data transfer information and the second data transfer information₁; and

transmitting, by the second processor ~~transmits~~ the read-out data stored in the second memory to the information processing device.